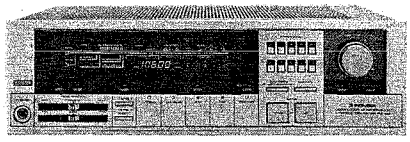
PIONEER®

Service Manual

REPAIR & ADJUSTMENTS



ORDER NO.
ARP-293-0

AM/FM STEREO RECEIVER

SX-60

MODEL SX-60 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U. S. A. model
KC	AC120V only	Canada model
S	AC110V, 120V, 220V, 240V (switchable)	General export model
S/G	AC110V, 120V, 220V, 240V (switchable)	U. S. Military model

- **This service manual is applicable to the KU type.**
  For servicing of the other types, please refer to the additional service manual.
- **For the circuit descriptions, please refer to the SX-60, SX-50, SX-40 service manual (ARP-393-0).**
- **Ce manuel d'instruction se refère au mode de réglage, en fraçais.**
- **Este manual de de servicio trata del método de ajuste escrito en español.**

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SX-60

1. SPECIFICATIONS

Amplifier Section

Continuous Average Power Output is 80 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.005% total harmonic distortion.**

Intermodulation Distortion (50 Hertz; 7,000 Hertz = 4:1, 8 ohms, from POWER IN)
- continuous rated power output . . . . . No more than 0.005%

Input (Sensitivity/Impedance)
- PHONO MM 2.5mV/50kilohms
- PHONO MC 0.25mV/100ohms
- CD/AUX, TAPE PLAY1. 2, VIDEO 150mV/50kilohms

Phono Overload Level (T.H.D. 0.007% 1,000Hz)
- PHONO MM 150mV
- PHONO MC 14mV

Output (Level/Impedance)
- TAPE REC 1. 2 . . . . . 150mV/2.2kilohms
- SPEAKER . . . . . A,B,A series B, off (6 to 16ohms)

Frequency Response
- PHONO (RIAA Equalization) . . . 20Hz to 20,000Hz ± 0.3dB
- CD/AUX, TAPE PLAY 1.2, VIDEO . . . . . 5Hz to 100,000Hz $^{+0}_{-3}$dB

Tone control
- BASS . . . . . ±8dB (100Hz)
- TREBLE . . . . . ±8dB (10kHz)

Loudness Contour (Volume control set at −40dB position) . . . . . +6dB (100Hz), +3dB (10,000Hz)

Filter
- SUBSONIC 20Hz (6dB/oct)

Hum and Noise (IHF, short circuited, A network)
- PHONO MM 86dB
- PHONO MC 67dB
- CD/AUX, TAPE PLAY1. 2, VIDEO 95dB

FM Tuner Section

Frequency range . . . . . 87.5MHz to 108MHz

Usable Sensitivity . . . . . 10.3 dBf, IHF (0.9μV/75ohms)

50dB Quieting Sensitivity
- MONO . . . . . 15.7dBf, IHF (1.6μV/75ohms)
- STEREO . . . . . 37dBf, IHF (19.5μV/75ohms)

Signal-to-Noise Ratio
- MONO . . . . . 83dB (at 65dBf)
- STEREO . . . . . 80dB (at 85dBf)

Distortion (at 65dBf)
- MONO 100Hz 0.1%
- 1kHz 0.07%
- 6kHz 0.15%
- STEREO 100Hz 0.2%
- 1kHz 0.1%
- 6kHz 0.25%

Capture Ratio 1.0dB

Alternate Channel Selectivity 400kHz; 80dB

Stereo Separation 1kHz; 50dB
30Hz to 15kHz; 35dB

Frequency Response . . . . . 20Hz to 15kHz $^{+0}_{-1.0}$ dB

AUTO TUNING threshold 29.3dBf (8μV/75ohms)

Antenna Input . . . . . 300ohms balanced, 75ohms unbalanced

AM Tuner Section

Frequency range . . . . . 522kHz to 1620kHz
(When 10kHz step) 520kHz to 1620kHz

Sensitivity (IHF, Loop antenna) 220μV/m
(IHF, EXT. antenna) 10μV

Selectivity 60dB

Signal-to-Noise Ratio 50dB

Antenna . . . . . High sensitivity Loop Antenna

Miscellaneous

Power Requirements . . . . . AC 120V, 60Hz

Power Consumption . . . . . 310W (UL)

Dimensions . . . . . 420(W) x 130(H) x 364(D) mm
16-9/16(W) x 5-2/16(H) x 14-5/16(D) in

Weight (without package) 10.3kg (22lb 11oz)

Furnished Parts

FM T-type Antenna 1

AM Loop Antenna 1

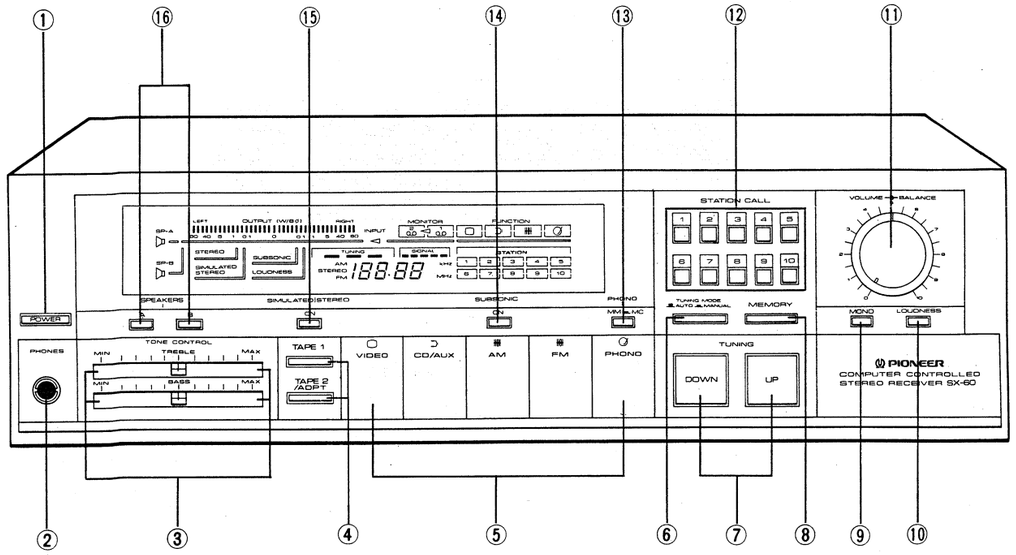
Operating Instructions 1

* Measured pursualt to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.

** Measured by Audio Spectrum Analyzer.

NOTE:
Specifications and the design subject to possible modifications without notice due to improvements.

2. FRONT PANEL FACILITIES



① POWER SWITCH

Power is supplied to the unit when this switch is depressed. To turn off the power, release the switch.

② PHONES JACK

Plug the headphones into this jack when you want to listen to a performance alone.

- When listening through the headphones alone, set both SPEAKERS SWITCHES A and B to OFF.

③ TONE CONTROL

This control is used to adjust the tone quality.

BASS . . . . Use this control to adjust the bass of the sound. When the control is moved from the central position towards "MIN", the bass is attenuated and when it is moved towards "MAX", the bass is emphasized.

TREBLE . . Use this control to adjust the treble of the sound.
When the control is moved from the central position towards "MIN", the treble is attenuated and when it is moved towards "MAX", the treble is emphasized.

④ TAPE MONITOR SWITCHES

Use these switches when playing back tapes or monitoring a recording. There are tape terminals for two systems on this receiver. Two tape decks can be attached and recording or playback performed. The two tape decks can also be used for recording simultaneously or for copying from one tape to another (but only from tape deck 1 to tape deck 2).

TAPE 1 . . Press when performing with a tape deck connected to the TAPE 1 jacks on the rear panel. Also, press when copying a tape from tape deck 1 to tape deck 2.

TAPE 2 . . Press when performing with a tape deck or other adaptor connected to the TAPE 2 jacks on the rear panel.

⑤ FUNCTION SWITCHES

VIDEO SWITCH:
Press this switch when listening to a video unit such as a VCR or laser disc player connected to the VIDEO SOUND jacks on the rear panel.

CD/AUX SWITCH:
Press this switch when listening to a compact disc player (CD player) or TV tuner connected to the CD/AUX jacks on the rear panel.

AM SWITCH:
Press this switch for AM reception.

FM SWITCH:
Press this switch for FM reception.

PHONO SWITCH:
Press this switch when listening to a record on a turntable connected to the PHONO jacks on the rear panel.

⑥ TUNING MODE SWITCH

This switch is used to select either AUTO search or MANUAL tuning.

■ AUTO (released position):
When the TUNING switch is pressed, the broadcasting stations are automatically scanned. Once a station has been found, the scanner stops at that frequency. To listen to another station, press the TUNING switch once again and the procedure is repeated. The procedure stops as soon as another station is found.

▬ MANUAL (depressed position):
For normal manual tuning.
Press the TUNING switch and tune in to the desired station manually.

NOTES:

- *If the broadcasting station is distant and its signals weak, you may not be able to find the station with AUTO tuning. In such an event, tune in to the desired station using MANUAL mode (▬ depressed position).*
- *If the AUTO mode stops frequently when trying to tune into an AM broadcast because of city interference or weak nighttime stations, tune in using the MANUAL mode (▬ depressed position).*

⑦ TUNING SWITCHES

These are used to select the broadcasting station.
During MANUAL tuning, if the TUNING switch is depressed once, the frequency changes one step at a time. If the TUNING switch is kept depressed, the frequency changes continuously.

NOTE:
During AUTO SEARCH tuning, intermittent noise may occur, but this is not a malfunction.

⑧ MEMORY SWITCH

This switch is used to preset the broadcasting stations into the STATION CALL switches.
When this switch is depressed, the STATION indicators light up from 1 to 10 in sequence. To preset the station, press the STATION CALL switch when the indicator lights up.

⑨ MONO SWITCH

This switch is depressed to mix the L and R channel stereo input signals and listen to them in mono through both the left and right speakers.

⑩ LOUDNESS SWITCH

When listening to a performance when the VOLUME level is low, depress this switch and the bass and treble will be accentuated.
When the volume is low, the human ear finds it harder to hear the bass and treble than when the volume is high. The LOUDNESS switch is thus designed to compensate for this deficiency.

⑪ VOLUME/BALANCE CONTROL

The inside knob is the VOLUME control and the outside knob the BALANCE control.

VOLUME:
This control is used to adjust the volume of the speakers and headphones. To increase the output level, turn the knob slowly clockwise (↷).

BALANCE:
This control is used to balance the volume of the left and right channels. If the sound appears to be weaker from the right speaker, turn the BALANCE control clockwise (↷), If the sound is weaker from the left speaker, turn the control counterclockwise. (↶).

NOTE:
When operating the VOLUME control, be careful not to turn the BALANCE control at the same time.

⑫ STATION CALL SWITCHES

Once the broadcasting stations are preset to these STATION CALL switches, the desired station can be received merely by pressing the appropriate switch and without having to operate the TUNING switch each time.

⑬ PHONO SELECTOR SWITCH

When playing a record on a turntable, adjust this switch in accordance with the cartridge type being used.
Depress the switch (▬ MC) when listening to a performance from an MC cartridge turntable. Release the switch (■ MM) when using an MM cartridge turntable.

⑭ SUBSONIC SWITCH

When this switch is depressed, the subsonic filter operates. The filter attenuates frequencies lower than 20Hz by 6dB/oct and can be used to suppress the ultra low range noise generated by record warp and other factors. This noise cannot actually be heard by the ear, but it can cause intermodulation distortion and even damage to the speaker systems. Use therefore as required.

⑮ SIMULATED STEREO SWITCH

This turns monaural signals into simulated stereo sound. Use this when you wish to experience the sense of stereo presence with AM broadcasts, VCR or other monaural signal sources.

NOTE:
This function can also be used with stereo sources, but it will result in a different sound from the normal stereo sound.

⑯ SPEAKERS SWITCHES

Depress the switch corresponding to the speakers connected to the SPEAKERS terminals (A and B) on the rear panel. "A" refers to the speakers which have been connected to the A SPEAKERS terminals, while "B" refers to the speakers which have been connected to the B SPEAKERS terminals.

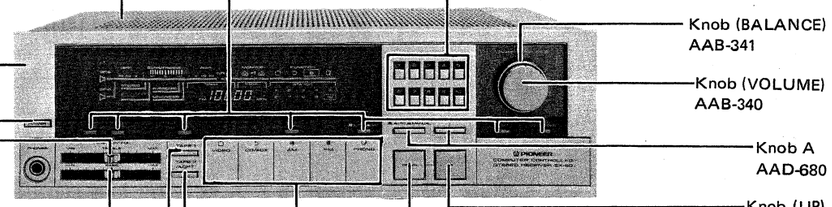
NOTE:
No sound will be heard through the speakers when both A and B switches are depressed if only one set of speakers has been connected to either A or B SPEAKERS terminals.

3. PARTS LOCATION

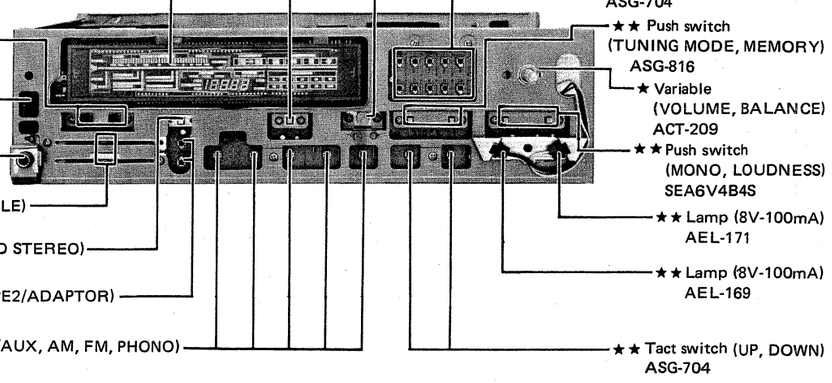
NOTES:

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★ .*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

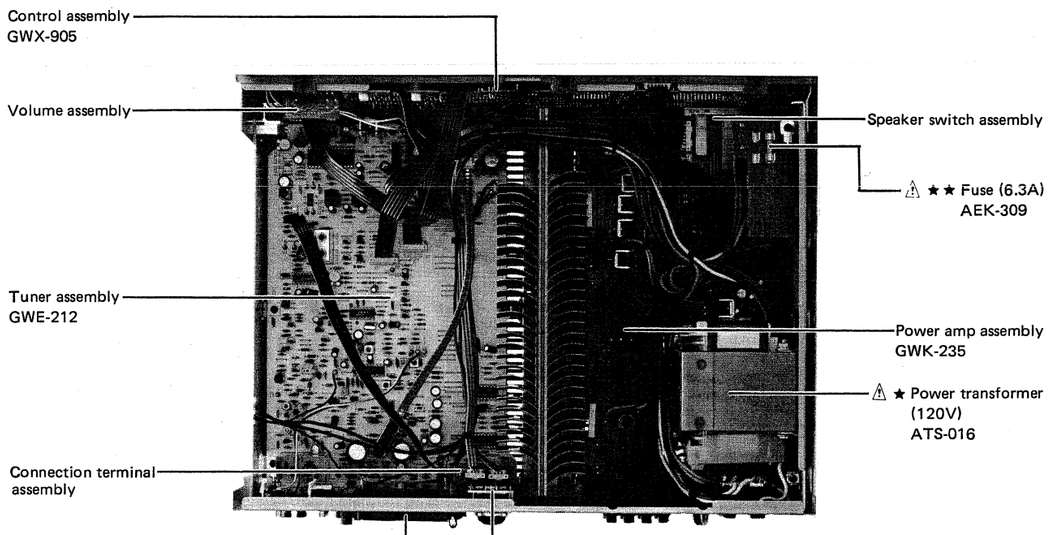
Front Panel View



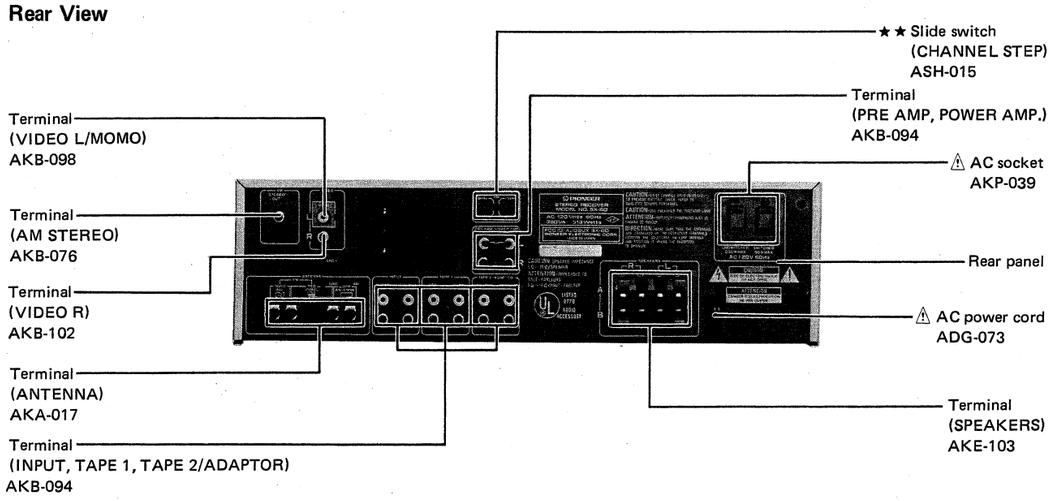
Front View



Top View



Rear View

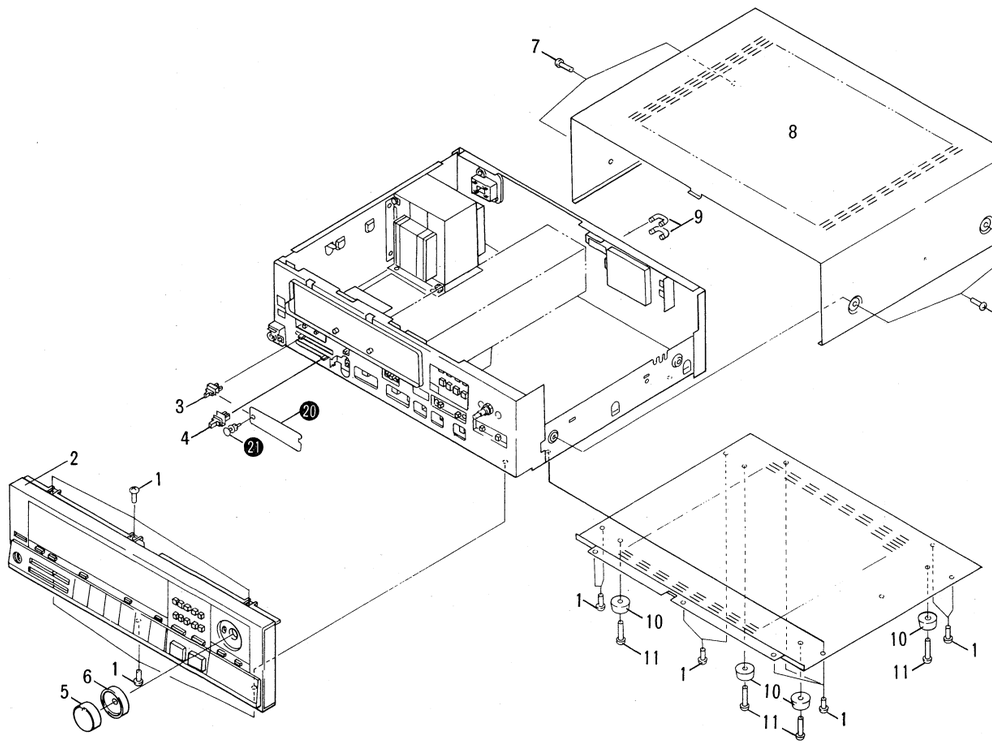


4. EXPLODED VIEW AND PARTS LIST

NOTES:

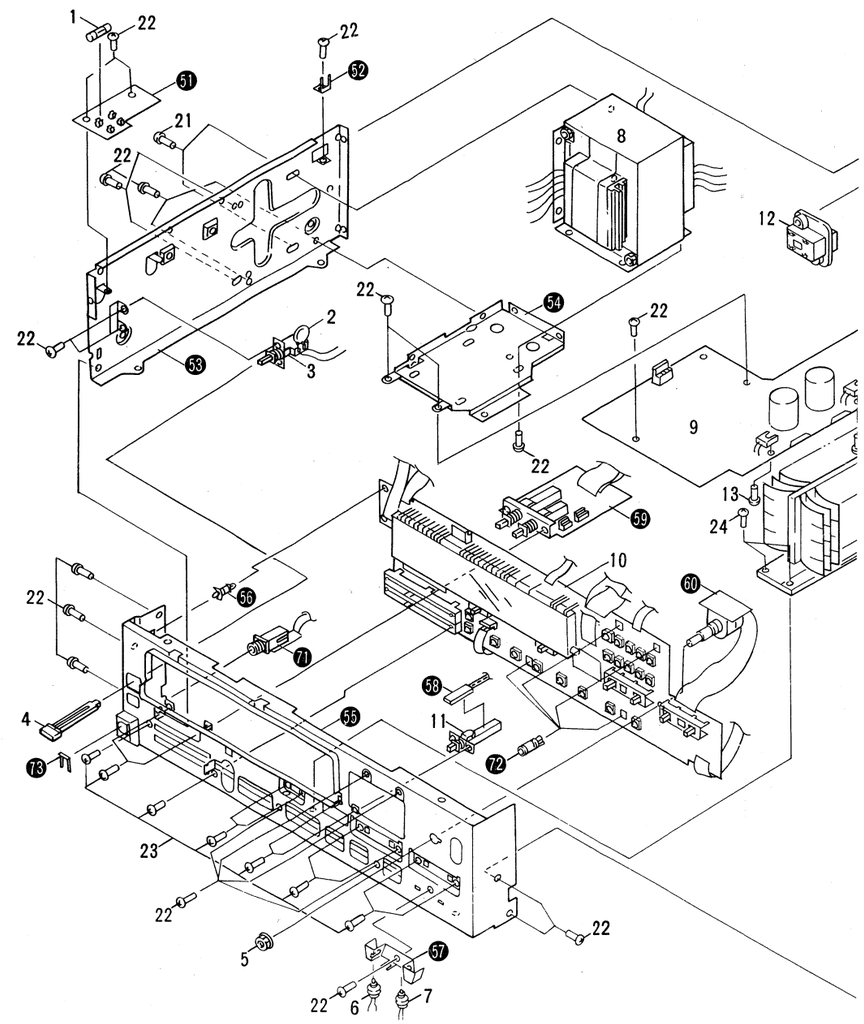
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Exterior Components



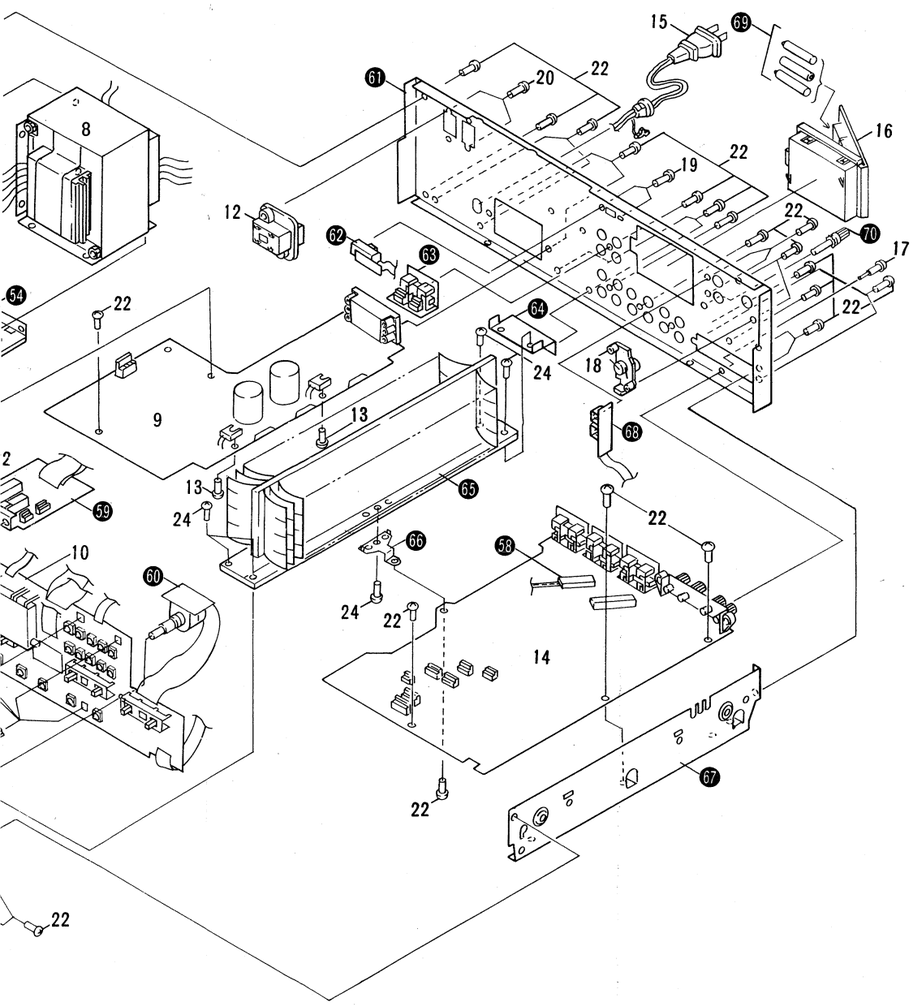
Parts List

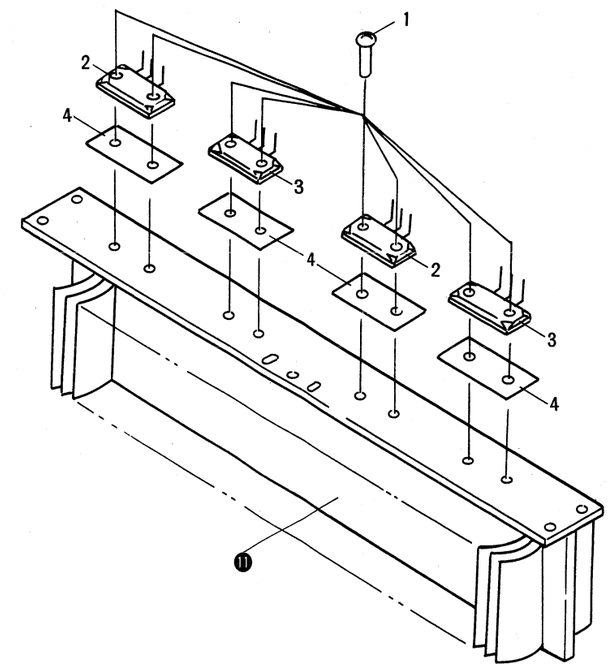
Mark	No.	Part No.	Description
	1.	BBZ30P080FZK	Screw (3 x 8)
	2.	ANM-377	Front panel assembly
	3.	AAD-685	Knob A
	4.	AAD-686	Knob B
	5.	AAB-340	Knob (VOLUME)
	6.	AAB-341	Knob (BALANCE)
	7.	ABA-193	Screw
	8.	ANE-438	Bonnet
	9.	AKM-041	Connection pin
	10.	AEC-613	Bumper
	11.	VTZ40P100FMC	Screw (4 x 10)
	20.		Masking sheet
	21.		Rivet



Parts List

Mark	No.	Part No.	Description
⚠ ★★	1.	AEK-309	Fuse (6.3A)
⚠	2.	ACG-502	Ceramic (0.01/AC125V)
⚠ ★★	3.	ASG-541	Push switch (POWER)
	4.	AAD-684	Knob (POWER)
	5.	ABN-048	Nut
★★	6.	AEL-169	Lamp (8V-100mA)
★★	7.	AEL-171	Lamp (8V-100mA)
⚠ ★	8.	ATS-016	Power transformer
	9.	GWK-235	Power amp assembly
	10.	GWX-905	Control assembly
	11.	ASX-143	Push switch (MC/MM)
⚠	12.	AKP-039	AC socket
	13.	ABA-234	Screw
	14.	GWE-212	Tuner assembly
⚠	15.	ADG-073	AC power cord
	16.	AXC-019	Battery case
	17.	ABA-176	Screw
	18.	AKB-076	Terminal (AM STEREO)
	19.	PMZ30P060FZB	Screw (3 x 6)
	20.	MTZ30P100FZK	Screw (3 x 10).
	21.	BMZ40P080FZB	Screw (4 x 8)
	22.	BBZ30P080FZK	Screw (3 x 8)
	23.	VBZ30P060FMC	Screw (3 x 6)
	24.	BBZ30P200FMC	Screw (3 x 20)





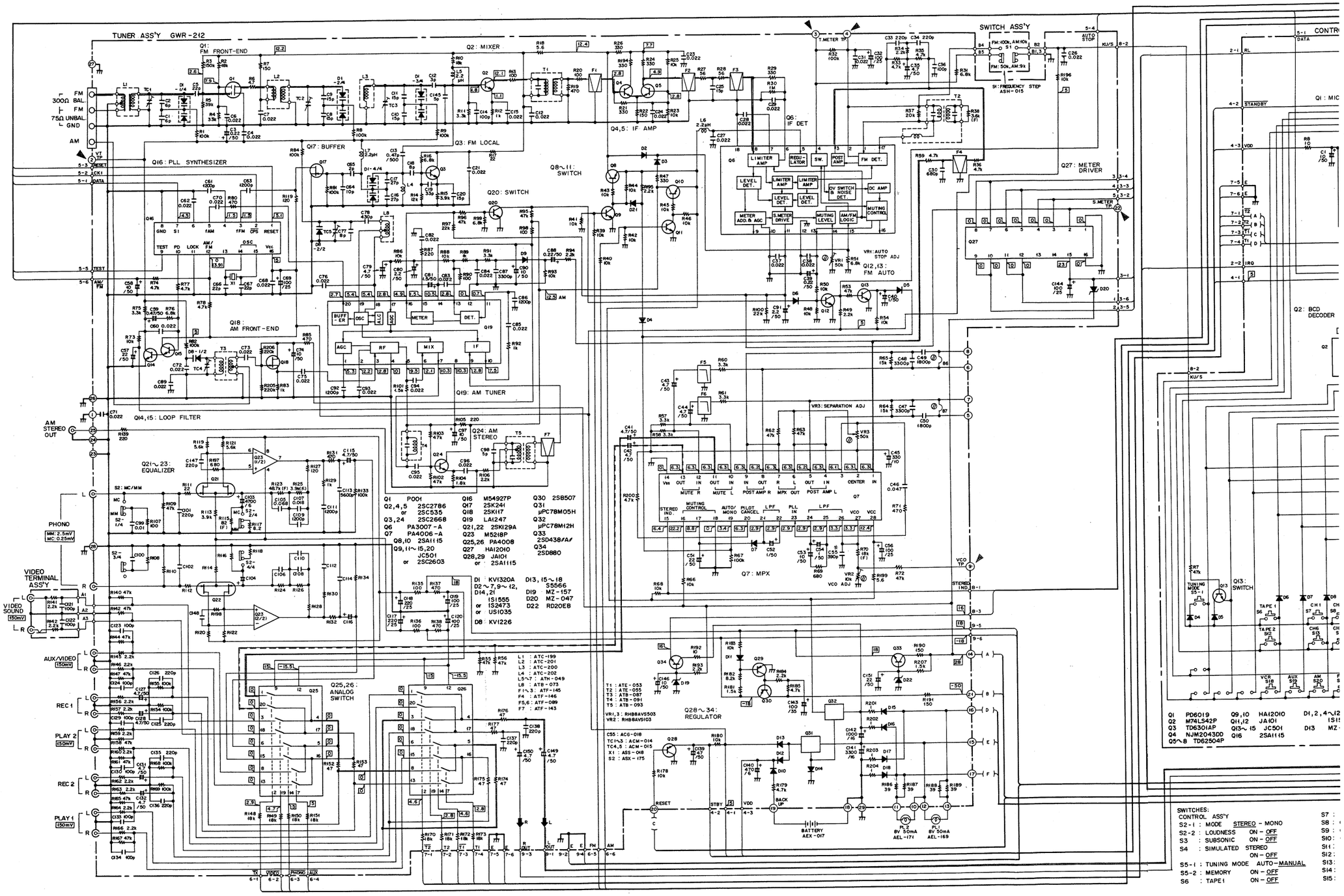
Description	Mark	No.	Part No.
Push switch (MC/MM)		51.	
AC socket		52.	
Screw		53.	
Tuner assembly		54.	
AC power cord		55.	
Battery case		56.	
Screw		57.	
Terminal (AM STEREO)		58.	
Screw (3 x 6)		59.	
Screw (3 x 10).		60.	
Screw (4 x 8)			
Screw (3 x 8)			
Screw (3 x 6)			
Screw (3 x 20)			

Description	Mark	No.	Part No.
Fuse assembly		61.	
Grounding terminal		62.	
Side frame L		63.	
Transformer frame		64.	
Front frame		65.	
Rivet		66.	
Lamp holder		67.	
Remote wire		68.	
Speaker switch assembly		69.	
Volume assembly		70.	
		71.	
		72.	
		73.	

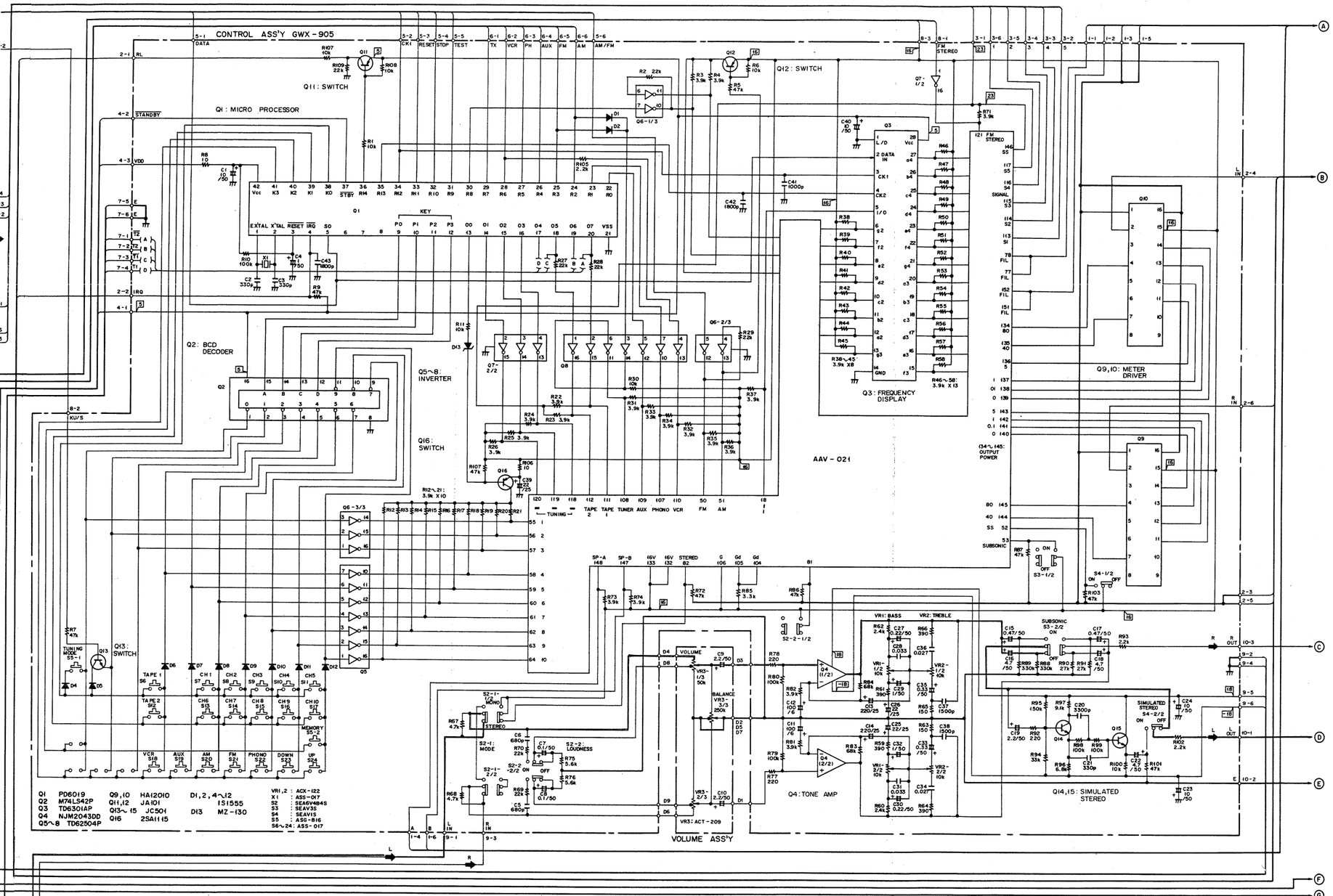
Parts List

Mark	No.	Part No.	Description
	1.	ABA-258	Screw
⚠ ★★	2.	2SC2922/A/-Y* (2SC2922/A/-P*) (2SC2922/A/-G*)	Q1, Q2
⚠ ★★	3.	2SA1216/A/-Y* (2SA1216/A/-P*) (2SA1216/A/-G*)	Q3, Q4
		**The hfe value of Q1, Q3 and Q2, Q4 must be the same.*	
	4.	AEC-886	Insulating sheet
	11.		Heat sink

5. SCHEMATIC DIAGRAM



NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



SWITCHES:
CONTROL ASS'Y
S2-1 : MODE STEREO – MONO
S2-2 : LOUDNESS ON – OFF
S3 : SUBSONIC ON – OFF
S4 : SIMULATED STEREO ON – OFF
S5-1 : TUNING MODE AUTO–MANUAL
S5-2 : MEMORY ON – OFF
S6 : TAPE1 ON – OFF
S7 : CH1 ON – OFF
S8 : CH2 ON – OFF
S9 : CH3 ON – OFF
S10 : CH4 ON – OFF
S11 : CH5 ON – OFF
S12 : TAPE 2 ON – OFF
S13 : CH6 ON – OFF
S14 : CH7 ON – OFF
S15 : CH8 ON – OFF
S16 : CH9 ON – OFF
S17 : CH10 ON – OFF
S18 : VCR ON – OFF
S19 : AUX ON – OFF
S20 : AM ON – OFF
S21 : FM ON – OFF
S22 : PHONO ON – OFF
S23 : DOWN ON – OFF
S24 : UP ON – OFF

SWITCH ASS'Y
S1 : FREQUENC STEP 100k/10k – 50k/9k
TUNER ASS'Y
S2 : MC/MM MC – MM

The underlined indicates the switch position.

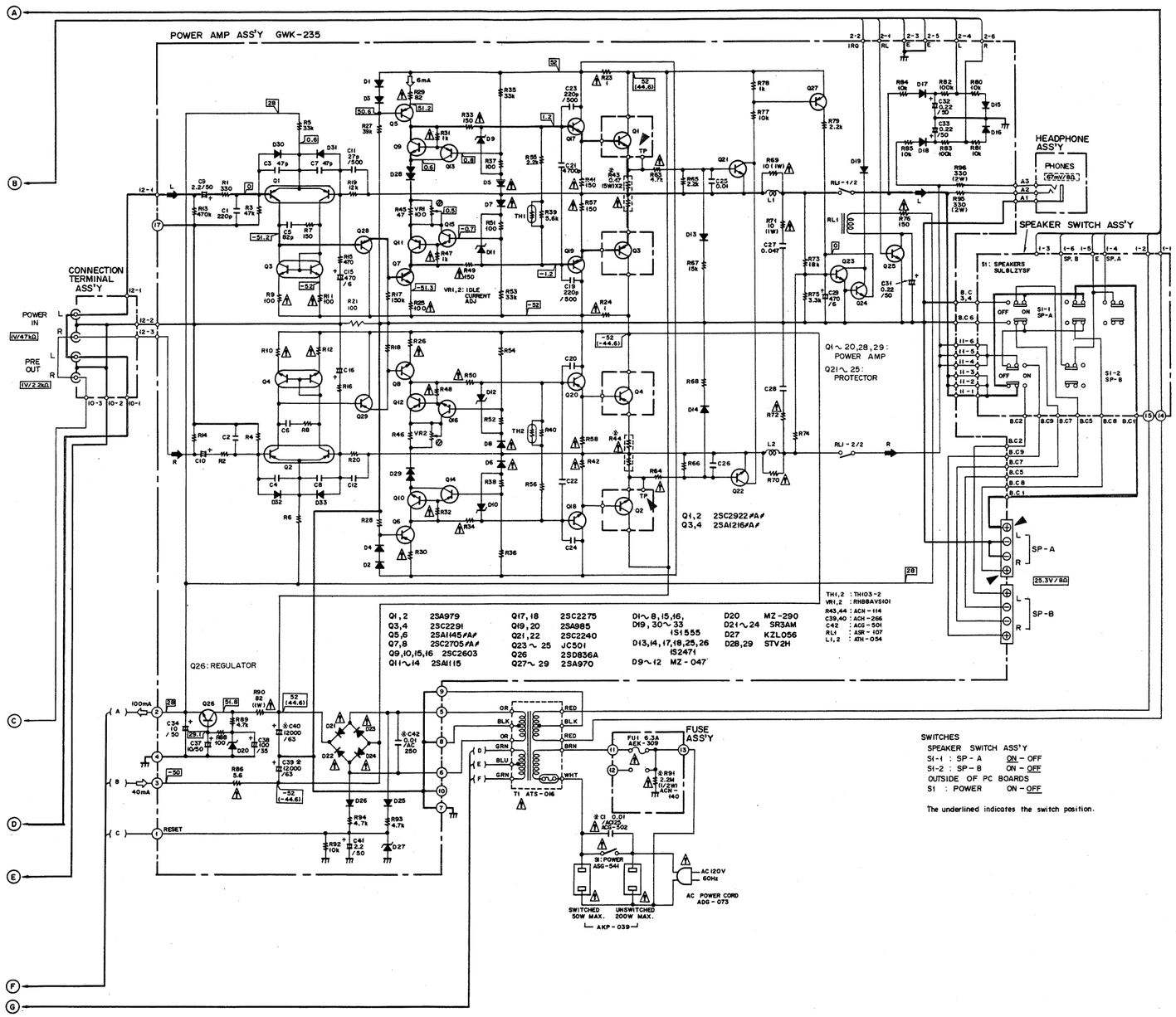
1. RESISTORS.
Indicated in Ω, ¼W, ½ W.±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT.
V; Signal voltage at (8Ω W+ 8Ω W , 8Ω)output (1kHz)
; DC voltage (V) at no input signal
Value in ( ) is DC voltage at rated power.
mA; DC current at no input signal
mV; Signal voltage at FM 400Hz ± 75kHz DEV.

4. OTHERS:
; Signal route.
; Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.


POWER AMP ASS'Y GWK-235
CONNECTION TERMINAL ASS'Y
POWER IN
PRE OUT
HEADPHONE ASS'Y
PHONES
SPEAKER SWITCH ASS'Y
S1: SPEAKERS SUL8LZYSF
S1-1 SP-A
S1-2 SP-B
SP-A
SP-B
Q1~20,28,29: POWER AMP
Q21~25: PROTECTOR
Q1,2 2SC2922#A#
Q3,4 2SA1216#A#
Q26: REGULATOR
Q1,2 2SA979
Q3,4 2SC2291
Q5,6 2SA1145#A#
Q7,8 2SC2705#A#
Q9,10,15,16 2SC2603
Q11~14 2SA1115
Q17,18 2SC2275
Q19,20 2SA985
Q21,22 2SC2240
Q23~25 JC501
Q26 2SD836A
Q27~29 2SA970
D1~8,15,16, D19,30~33 1S1555
D13,14,17,18,25,26 1S2471
D9~12 MZ-047
D20 MZ-290
D21~24 SR3AM
D27 KZL056
D28,29 STV2H
TH1,2 : TH103-2
VR1,2 : RH88AVS101
R43,44 : ACN-1114
C39,40 : ACH-266
C42 : ACG-501
RL1 : ASR-107
L1,2 : ATH-054
FUSE ASS'Y
FU1 6.3A AEK-309
T1 ATS-016
S1: POWER ASG-544
AC 120V 60Hz
AC POWER CORD ADG-073
SWITCHED 50W MAX.
UNSWITCHED 200W MAX.
AKP-039
SWITCHES
SPEAKER SWITCH ASS'Y
S1-1 : SP-A ON-OFF
S1-2 : SP-B ON-OFF
OUTSIDE OF PC BOARDS
S1 : POWER ON-OFF
The underlined indicates the switch position.

6. P.C.BOARD CONNECTION DIAGRAM

TUNER Ass'y(GWR-212)

VIDEO TERMINAL Ass'y

AM STEREO OUT

SWITCH Ass'y

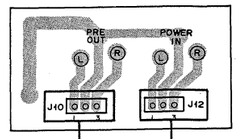
S1 FREQUENCY STEP

BATTERY AEX-017

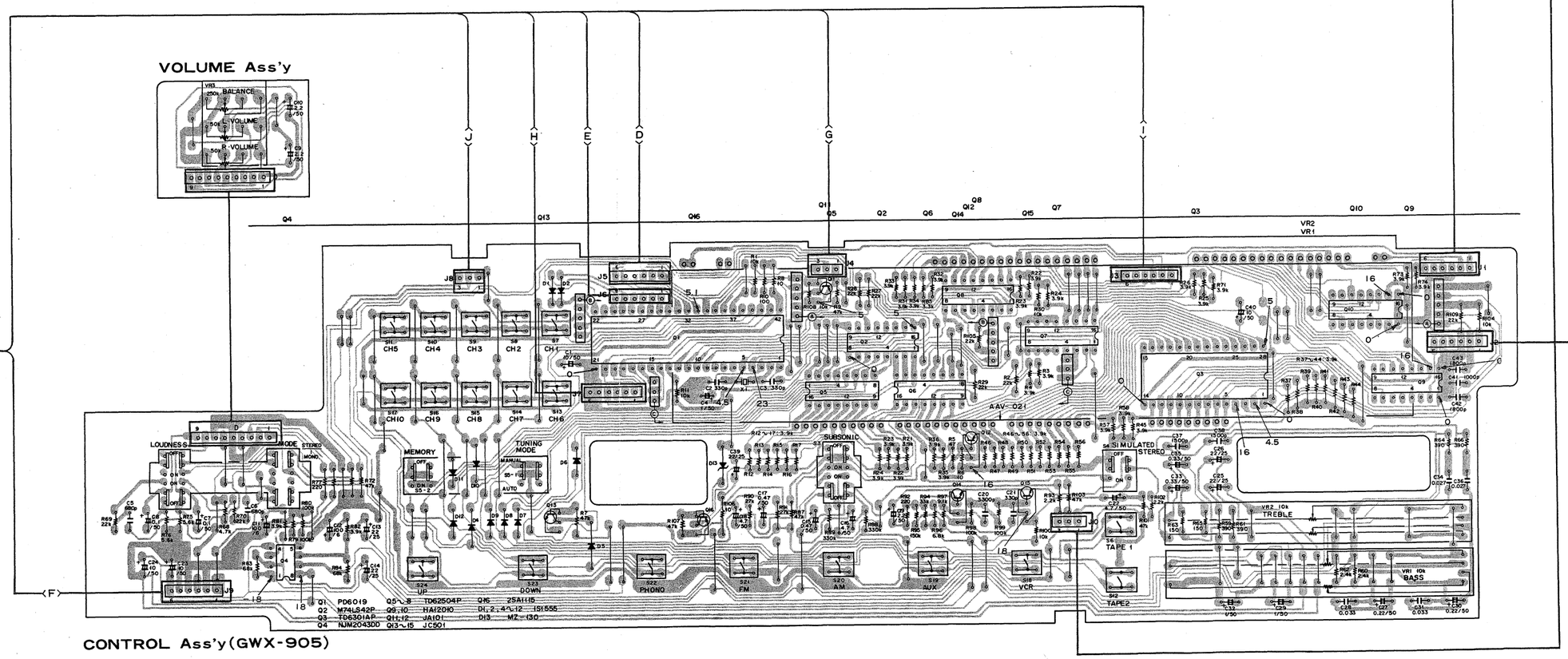
PL1 8V50mA AEL-169

PL2 8V50mA AEL-171

CONNECTION TERMINAL Ass'y



VOLUME Ass'y



CONTROL Ass'y(GWX-905)

7 8 9 10 11 12

A B C D

SPEAKER SWITCH Ass'y

POWER AMP Ass'y (GWK-235)

FUSE Ass'y

Q1 : 2SC2922/A/

Q2 : 2SC2922/A/

Q3 : 2SA1216/A/

Q4 : 2SA1216/A/

T1 : POWER TRANSFORMER ATS-016

C1 : 0.01/ AC125 ACG-502

S1 : POWER ASG-541

AC120V 60Hz

AC POWER CORD ADG-073

SWITCHED 50W MAX.

UNSWITCHED 200W MAX.

HEADPHONE Ass'y

PHONES

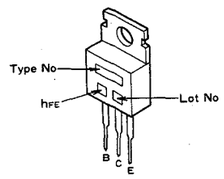
BASS

7 8 9 10 11 12

22

External Appearances of Transistors and ICs

2SD836A
2SD880



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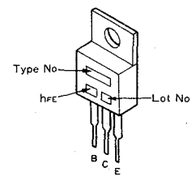
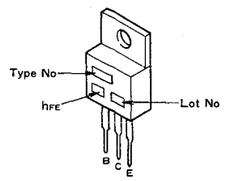
2SC2275



2SB507



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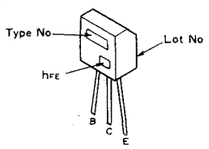
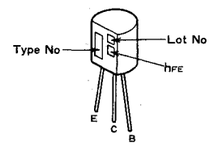
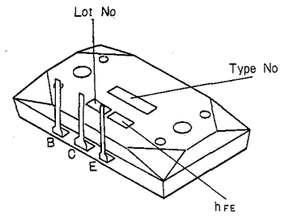


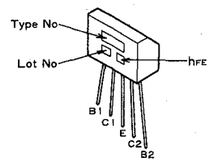
2SA1216/A/
2SC2922/A/

2SA970
2SC2240





2SA979



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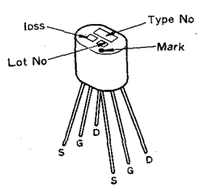

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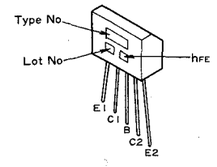

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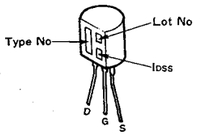
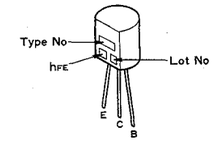
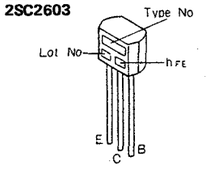


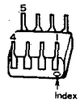
JA101
JC501



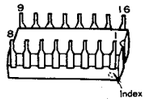
2SA1115
2SC2603



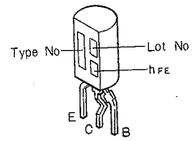
M5218P
NJM2043DD



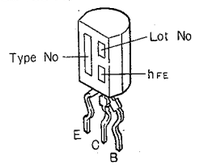
HA12010
M54927P
M74LS42P
TD62504P



2SA1145/A/
2SC2705/A/



2SD438/A/



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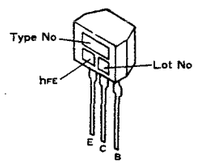

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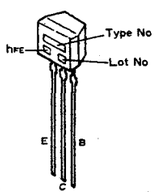
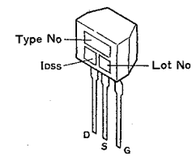
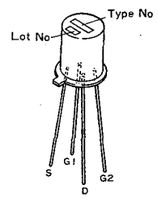


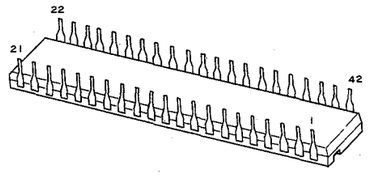
2SK241



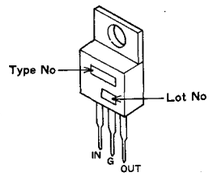
P001



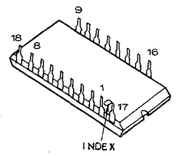
PD6019



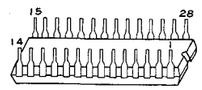
μPC78M05H
μPC78M12H



PA3007
PA3007-A



TD6301AP



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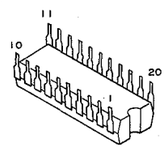

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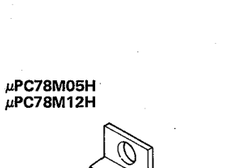
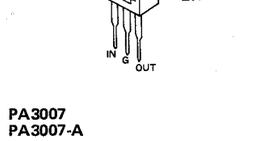


PA4006-A
PA4006



7. ELECTRICAL PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω	*56 × 10¹*	*561 .....*	*RD¼PS* 5 6 1	*J*
47kΩ	*47 × 10³*	*473 .....*	*RD¼PS* 4 7 3	*J*
0.5Ω	*0R5*	*.....*	*RN2H* 0 R 5	*K*
1Ω	*010*	*.....*	*RS1P* 0 1 0	*K*

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*5621 ....*	*RN¼SR* 5 6 2 1	*F*

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★ .*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts List

P. C. BOARD ASSEMBLIES

Mark	Part No.	Symbol & Description
	GWE-212	Tuner assembly
	GWK-235	Power amp assembly
	GWX-905	Control assembly
	non supply	Headphone jack assembly
	non supply	Connection terminal assembly
	non supply	Speaker switch assembly
	non supply	Fuse assembly
	non supply	Video terminal assembly
	non supply	Switch assembly
	non supply	Volume assembly

OTHERS

Mark	Part No.	Symbol & Description
⚠ ★	ATS-016	T1 Power transformer
⚠ ★★	AEK-309	FU1 Fuse (6.3A)
⚠	ADG-073	AC power cord
⚠	AKP-039	AC socket
⚠	ACG-502	C1 Ceramic (0.01/AC125V)
⚠ ★★	2SA1216/A/-Y* (2SA1216/A/-P*) (2SA1216/A/-G*)	Q3, Q4
⚠ ★★	2SC2922/A/-Y* (2SC2922/A/-P*) (2SC2922/A/-G*)	Q1, Q2
	** The hfe value of Q1, Q3 and Q2, Q4 must be the same.*	
	AKB-076	Terminal (AM STEREO)
★★	AEL-169	PL1 Lamp (8V-100mA)
★★	AEL-171	PL2 Lamp (8V-100mA)
⚠ ★★	ASG-541	S1 Push switch (POWER)
★★	ASX-143	Push switch (MC/MM)
	AKM-041	Connection plug

Power Amp Assembly (GWK-235)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	1S1555 (1S2473) (US1035)	D1 – D4, D15, D16, D19, D30 – D33
⚠ ★	1S1555	D5 – D8
★	1S2471	D13, D14, D17, D18, D25, D26
⚠ ★	SR3AM-4/H/	D21 – D24
★	STV2H	D28, D29
★	MZ-047	D9 – D12
★	MZ-290	D20
★	KZL056	D27
★★	JC501 (2SC2603)	Q23 – Q25
★★	2SA970	Q27 – Q29
★★	2SA1145/A/	Q5, Q6
★★	2SA979	Q1, Q2
★★	2SA985-Q* (2SA985-R*)	Q19, Q20
★★	2SC2275-Q* (2SC2275-R*)	Q17, Q18
	**The hfe value at Q17, Q19 and Q18, Q20 must be the same.*	
★★	2SA1115	Q11 – Q14
★★	2SC2603	Q9, Q10, Q15, Q16
★★	2SC2240	Q21, Q22
★★	2SC2705/A/	Q7, Q8
★★	2SC2291	Q3, Q4
★★	2SD836A	Q26

CAPACITORS

Mark	Part No.	Symbol & Description
	ACG-501	C42 Ceramic (0.01/AC250V)
	ACH-266	C39, C40 Electrolytic (12000/63V)
	CCDSL 470J 50	C3 – C8
	CCDSL 820J 50	C5, C6
	CCDSL 221J 50	C1, C2
	CCDSL 221K 500	C19, C20, C23, C24
	CCDSL 270K 500	C11, C12
	CEA R22M 50L	C31 – C33
	CEA 2R2M 50L	C9, C10, C41
	CEA 100M 50L	C34, C37
	CEA 101M 35L	C38
	CEA 471M 6L	C15, C16, C29
	CKDYF 103Z 50	C25, C26
	CQMA 472K 50	C21, C22
	CQMA 473K 50	C27, C28

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	TH103-2	TH1, TH2
⚠	ACN-114	R43, R44 Wire-wound (0.47 x 2/5W)
★	RHB8AVS101-T	VR1, VR2 100 (Idle current)
⚠	RS1LF100J	R69 – R72
⚠	RS1LMF820J	R90
	RS2LMF331J	R95, R96
⚠	RD1/4PMF □□□J	R9 – R12, R23 – R26, R29 – R34
⚠		R41, R42, R47 – R50, R57, R58
⚠		R63, R64, R76, R86
	RD1/4PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	AKE-103	Terminal (SPEAKERS)
★★	ASR-107	RL1 Relay
	ATH-054	L1, L2 AF choke coil
	PBZ30P060FMC	Screw (3 x 6)

Headphone Jack Assembly

Mark	Part No.	Symbol & Description
	AKN-045	Phone jack (PHONES)

Connection Terminal Assembly

Mark	Part No.	Symbol & Description
	AKB-094	Terminal (PRE AMP, POWER AMP)

Speaker Switch Assembly

Mark	Part No.	Symbol & Description
★★	SUL8LZYSF	S1 Push switch (SPEAKERS A, B)

Fuse Assembly

Mark	Part No.	Symbol & Description
⚠	ACN-140	R91 Carbon compound (2.2M, 1/2)

Control Assembly (GWX-905)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	1S1555 (1S2473) (US1035)	D1 – D12
★	MZ-130	D13
★★	2SA1115	Q16
★★	JA101 (2SA1115)	Q11, Q12
★★	JC501 (2SC2603)	Q13 – Q15
★★	HA12010	Q9, Q10
★★	NJM2043DD	Q4
★★	M74LS42P	Q2
★★	PD6019	Q1
★★	TD6301AP	Q3
★★	TD62504P	Q5 – Q8

SWITCHES

Mark	Part No.	Symbol & Description
★★	SEA6V4B4S	S2 Push switch (MONO, LOUDNESS)
★★	SEAV3S	S3 Push switch (SUBSONIC)
★★	SEAV1S	S4 Push switch (SIMULATED STEREO)
★★	ASG-816	S5 Push switch (TUNING MODE, MEMORY)
★★	ASG-704	S6 – S24 Tact switch (STATION CALL, VIDEO, CD/AUX, PHONO, AM, FM, UP, DOWN, TAPE 1, TAPE 2/ADPT)

CAPACITORS

Mark	Part No.	Symbol & Description
	CKDYB 331K 50	C2, C3, C21
	CKDYB 681K 50	C5, C6
	CKDYB 102K 50	C41
	CKDYB 182K 50	C42, C43
	CQMLA 152K 50	C37, C38
	CQMLA 332K 50	C20
	CQMLA 273K 50	C34, C36
	CQMLA 333K 50	C28, C31
	CEJA 0R1M 50	C7, C8
	CEJA R22M 50	C27, C30
	CEJA R33M 50	C33, C35
	CEJA R47M 50	C15, C17
	CEJA 010M 50	C4, C29, C32
	CEJA 2R2M 50	C19
	CEJA 4R7M 50	C16, C18, C22

Mark	Part No.	Symbol & Description
	CEJA 100M 50	C1, C23, C24, C40
	CEJA 220M 25	C13, C14, C25, C26, C39
	CEJA 101M 6	C11, C12

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★	ACX-122	VR1, VR2 (10k x 2) BASS, TREBLE
	RD1/4PMF100J	R106
	RD1/8PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
★	ASS-017	X1 Ceramic resonator
★	AAV-021	FL tube

Volume Assembly

Mark	Part No.	Symbol & Description
★	ACT-209	VR3 (250k, 50k x 2) VOLUME, BALANCE
	CEJA 2R2M 50	C9, C10

Tuner Assembly (GWE-212)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	KV1226-Y	D8
★	KV1320A-4	D1
★	S5566	D13, D15 – D18
★	MZ-047	D20
★	MZ-157	D19
★	RD20EB	D22
★	1S1555 (1S2473) (US1035)	D2 – D7, D9 – D12, D14, D21
★★	P001	Q1
★★	JA101 (2SA1115)	Q28, Q29
★★	JC501 (2SC2603)	Q9, Q11 – Q15, Q20
★★	2SA1115	Q8, Q10
★★	2SB507	Q30
★★	2SC2786 (2SC535)	Q2, Q4, Q5
★★	2SC2668	Q3, Q24
★★	2SD880	Q34
★★	2SD438/A/	Q33
★★	2SK117	Q18
★★	2SK129A	Q21, Q22
★★	2SK241	Q17
★★	HA12010	Q27
★★	LA1247	Q19
★★	M5218P	Q23
★★	M54927P	Q16
★★	PA3007-A (PA3007)	Q6
★★	PA4006-A (PA4006)	Q7
★★	PA4008	Q25, Q26
★★	μPC78M05H	Q31
★★	μPC78M12H	Q32

COILS AND TRANSFORMERS

Mark	Part No.	Symbol & Description
	ATC-199	L1 FM antenna coil
	ATC-201	L2 FM RF coil
	ATC-200	L3 FM RF coil
	ATC-202	L4 FM oscillator coil
	ATH-049	L5 – L7
	ATB-073	L8 AM oscillator coil
	ATE-053	T1 FM coupling transformer
	ATE-055	T2 FM detection transformer
	ATB-087	T3 AM antenna coil
	ATB-091	T4 AM detection transformer
	ATB-093	T5 AM IF transformer
	ATF-145	F1 – F3 FM ceramic filter
	ATF-146	F4 Beat eliminate filter
	ATF-089	F5, F6 Low pass filter
	ATF-143	F7 AM ceramic filter

CAPACITORS

Mark	Part No.	Symbol & Description
	ACM-014	TC1, TC2, TC3
	ACM-015	TC4, TC5
	ACG-018	C55 Ceramic (390P/50V)
	CGB R47K 500	C13
	CCDCH 020C 50	C65
	CCDCH 030C 50	C12
	CCDCH 100D 50	C64
	CCDCH 220J 50	C5, C66, C67
	CCDRH 060D 50	C1, C2
	CCDRH 150J 50	C8 – C11, C20, C25
	CCDRH 270J 50	C16
	CCDRH 330J 50	C19
	CCDRH 270J 50	C17
	CCDTH 080D 50	C18, C77
	CCDSL 050C 50	C98, C145
	CCDSL 101J 50	C14, C36, C123, C124, C129, C130, C133, C134
	CCDSL 221J 50	C33, C34, C101, C102, C125, C126 C135 – C138, C147, C148
	CKDYB 122K 50	C61, C63, C86, C92, C109 – C112
	CKDYF 223Z 50	C4, C6, C7, C15, C21 – C24, C26 – C29, C31, C37, C38, C60, C62, C68, C70 – C73, C75, C76, C82 – C85, C89, C93 – C96
	CKDYB 681K 50	C30
	CQSH 431J 50	C78
	CQMLA 183J 50	C107, C108
	CQMLA 683J 50	C105, C106
	CQMA 473K 50	C46
	CQMA 182K 50	C49, C50

Mark	Part No.	Symbol & Description
	CQMA 332K 50	C47, C48, C87
	CQMA 562K 50	C113, C114
	CQMA 103K 50	C99, C100
	CEANL R47M 50	C59
	CEA R22M 50L	C3, C39, C88
	CEA 010M 50L	C40, C52, C54
	CEA 1R5M 50L	C81
	CEA 2R2M 50L	C80, C91
	CEA 4R7M 50L	C35, C41 – C44, C79, C115, C116 C127, C128, C131, C132, C139, C149, C150
	CEA 100M 50L	C53, C58, C74, C90, C97, C146
	CEA 220M 50L	C51, C57, C151
	CEA 101M 25L	C32, C56, C69, C119, C120, C114
	CEA 101M 35L	C143
	CEA 221M 25L	C118
	CEA 331M 10L	C45
	CEA 471M 6L	C140
	CEA 102M 16L	C142
	CEA 332M 16L	C141
	CEA 472M 6L	C103, C104
	CEA 221M 25L	C117

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★	RHB8AVS103	VR2 (10k, VCO)
★	RHB8AVS503	VR1,VR3 (50k, Separation, auto stop)
	RN1/4PQ □□□□F	R38, R70, R115, R116, R123 – R126
	RD1/4PMF □□□J	R17, R18, R135 – R138, R186 – R192, R199, R201 – R204
	RD1/8PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	AKA-017	Terminal (ANTENNA)
	AKB-094	Terminal (TAPE 1, TAPE 2 /ADPT, INPUT)
★	ASS-018	X1 Crystal resonator
★★	ASX-175	S2 Remote slide switch (MC/MM)
	PBZ30P060FMC	Screw (3 x 6)

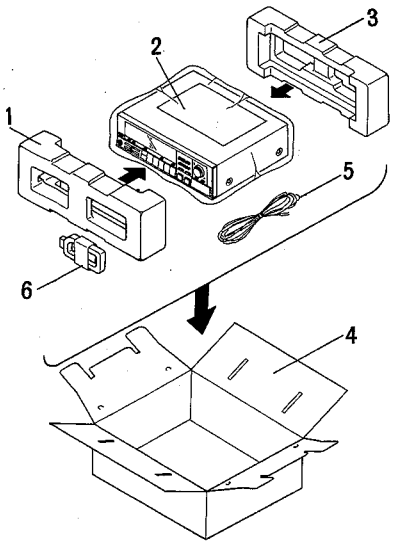
Video Terminal Assembly

Mark	Part No.	Symbol & Description
	CCDSL 101J 50	C121, C122
	RD1/8PM □□□J	R141, R143
	AKB-098	Terminal (VIDEO L/MONO)
	AKB-102	Terminal (VIDEO R)

Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASH-015	S1 Slide switch (CHANNEL STEP)

8. PACKING



Parts List

Mark	No.	Part No.	Description
	1.	AHA-346	Front pad
	2.	ARB-569	Operating instructions (English)
	3.	AHA-347	Rear pad
	4.	AHE-191	Packing case
	5.	ADH-005	FM antenna
	6.	ATB-086	Loop antenna

9. ADJUSTMENT

FM Tuner Section

Connect the FM SG to FM 300Ω antenna terminal through a 300Ω dummy antenna.

- Set FUNCTION to FM, and TUNING MODE to Manual.

Step	SG (400Hz, ±75kHz dev.)		SX-60 frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1	No signal		108.00MHz	L4	DC25V between TP2 and TP1 (ground)
2			87.50MHz	—	Confirm that DC voltage between TP2 and TP1 is 7V±1V.
3	90MHz	60dB	90.00MHz	L1 – L3	Adjust so that DC voltage between TP22 and TP1 (ground) is maximum.
4	106MHz	60dB	106.00MHz	TC1 – TC3	
5	Repeat steps 3 and 4 until maximum voltage is attained.				
6	98.000MHz*	66dB	98.00MHz	T1	Adjust until DC voltage between TP22 and TP1 (ground) is maximum.
7				T2(CENTER)	DC 0V between TP3 and TP4
8				T2(DIST)	Minimize the distortion at REC 1 terminal
9	Repeat steps 7 and 8 until requirements are satisfied.				
10	98MHz	37dB	98.00MHz	VR1	Adjust so that tuning indicators are illuminated.

** Frequency must be accurate.*

FM MPX Section

- Connect the FM multiplex stereo signal generator to the FM SG external modulation terminal.
- Set the output of the FM SG to 98.000MHz (with modulation mode set to external) and tune SX-60 to the frequency (98.00MHz)

Step	FM MPX SG		Adjustment point	Adjustment procedure
	MODULATION	LEVEL		
1	No modulation	66dB	VR2	Adjust signal at TP9 to 76kHz
2	Main (1kHz, L or R, ±33.75kHz dev.) Pilot (19kHz, ±7.5kHz dev.)	86dB	T1 within ±90°	Minimize the distortion at REC 1 terminal
3	Main (1kHz, L or R, ±33.75kHz dev.) Pilot (19kHz, ±7.5kHz dev.)		VR3	Adjust until crosstalk between L and R channel (at REC 1 terminal) is minimum.

AM Tuner Section

- Connect the AM loop antenna to AM antenna terminal.
- Set FUNCTION to AM, TUNING MODE to MANUAL position, CHANNEL STEP to 9kHz position.

Step	AM SG (400Hz, 30% MOD.)		SX-60 frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1	No signal		522kHz	L8	DC 2V between TP2 and TP1 (ground)
2			1620kHz	TC5	DC 25V between TP2 and TP1 (ground)
3	Repeat steps 1 and 2 until the required voltage is attained.				
4	603kHz	60dB	603kHz	T3	Adjust until voltage between TP22 and TP1 (ground) is maximum.
5	1395kHz	60dB	1395kHz	TC4	
6	Repeat steps 4 and 5 until maximum voltage is attained.				

AMPLIFIER SECTION

1. Turn VOLUME to minimum.
2. Set the SPEAKER A switch to ON.
3. Adjust VR1 so that DC voltage between TP-L and SPEAKERS A L⊕terminal is 40mV.
4. Adjust VR2 so that DC voltage between TP-R and SPEAKERS A R⊕terminal is 40mV.

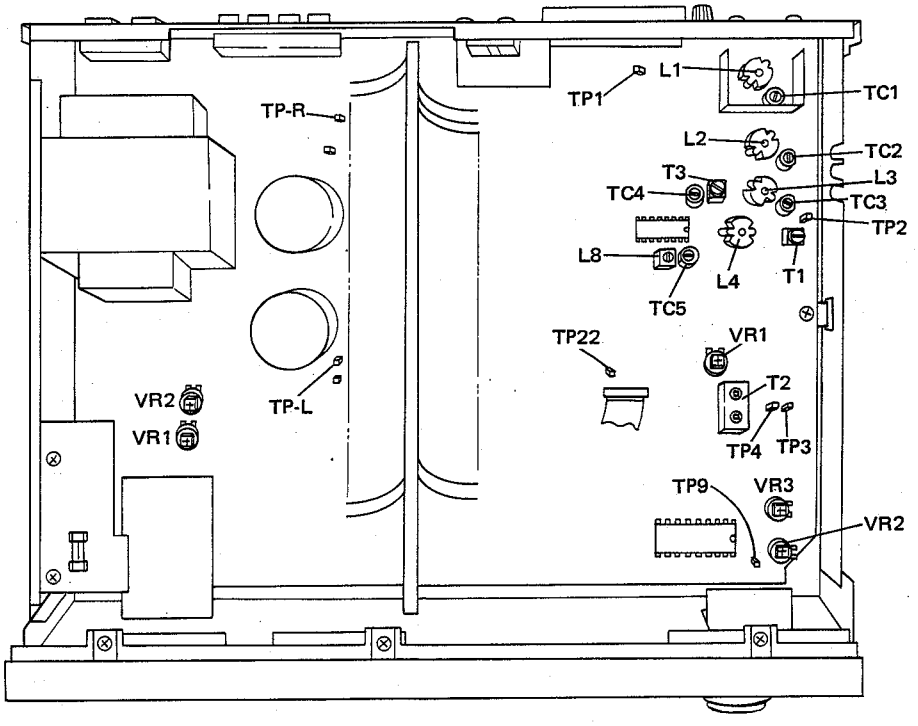


Fig. 9 Adjustment Point

9. RÉGLAGE

Partie tuner FM

- Brancher le générateur de signal FM sur la borne 300 ohms de l'antenne FM en intercalant une antenne fcitive de 300 ohms.
- Placer le commutateur FUNCTION sur la position FM, et le mode de syntonisation (TUNING MODE) sur manuel (Manual).

Phase	SG (400Hz, ±75kHz de déviation)		Affichage fréquence SX-60	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	Pas de signal		108,00MHz	L4	CC25V entre TP2 et TP1 (terre)
2			87,50MHz	—	S'assurer que la tension CC entre TP2 et TP1 est de 7V±1V.
3	90MHz	60dB	90,00MHz	L1 – L3	Continuer à régler jusqu'à ce que la tension entre TP22 et TP1 (terre) soit maximale.
4	106MHz	60dB	106,00MHz	TC1 – TC3	
5	Recommencer 3 et 4 jusqu'à ce que la tension maximale soit atteinte.				
6	98,000MHz*	66dB	98,00MHz	T1	Continuer à régler jusqu'à ce que la tension CC entre TP22 et TP1 (terre) soit maximale.
7				T2 (CENTRE)	0V CC entre TP3 et TP4.
8				T2 (DIST)	Réduire la distortion au minimum au niveau de la borne REC 1.
9	Recommencer 7 et 8 jusqu'à ce que les spécifications soient atteintes.				
10	98MHz	37dB	98,00MHz	VR1	Procéder au réglage afin que les témoins de syntonisation s'allument.

** La fréquence doit être précise*

Section FM MULTIPLEX

- Brancher le générateur de signal multiplex FM stéréo sur la borne de modulation externe du modulateur de signal FM.
- Régler la sortie du générateur de signal FM sur 98,000MHz (le mode de modulation étant sur externe), et régler le SX-60 sur la fréquence 98,000MHz.

Phase	FM MPX SG		Point de réglage	Méthode de réglage
	Modulation	Niveau		
1	Pas de modulation	66dB	VR2	Régler le signal au niveau de TP9 sur 76kHz.
2	Principal (1kHz, D+G, déviation de ±33,75kHz) Pilote (19kHz, déviation de ±7,5kHz)	86dB	T1 (entre ±90°)	Réduire la distortion au minimum au niveau de la borne REC 1.
3	Principal (1kHz, G ou D, déviation de ±33,75kHz) Pilote (19kHz, déviation de ±7,5kHz)		VR3	Continuer à régler jusqu'à ce que les interférences (au niveau de la borne REC 1) entre les canaux droit et gauche soient maximales.

PARTIE TUNER AM

- Brancher l'antenne-cadre AM sur la borne d'antenne AM.
- Placer le commutateur FUNCTION sur AM, le mode de syntonisation sur manuel (MANUAL), et le sélecteur de canal (CHANNEL STEP) sur la position 9kHz.

Phase	AM SG (400Hz, modulation de 30%)		Affichage fréquence SX-60	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	Pas de signal		522kHz	L8	CC 2V entre TP2 et TP1 (terre)
2			1620kHz	TC5	CC 25V entre TP2 et TP1 (terre)
3	Recommencer 1 et 2 jusqu'à ce que la tension voulue soit atteinte.				
4	603kHz	60dB	603kHz	T3	Continuer à régler jusqu'à ce que la tension entre TP22 et TP1 (terre) soit maximale.
5	1395kHz	60dB	1395kHz	TC4	
6	Recommencer 4 et 5 jusqu'à ce que la tension maximale soit atteinte.				

PARTIE AMPLIFICATRICE

1. Régler le volume (VOLUME) au minimum.
2. Placer le commutateur du haut-parleur A sur marche (ON).
3. Régler VR1 afin que la tension CC entre TP-L et la borne + gauche (L) du haut-parleur A soit de 40mV.
4. Régler VR2 afin que la tension entre TP-R et la borne + droit (R) du haut-parleur A soit de 40mV.

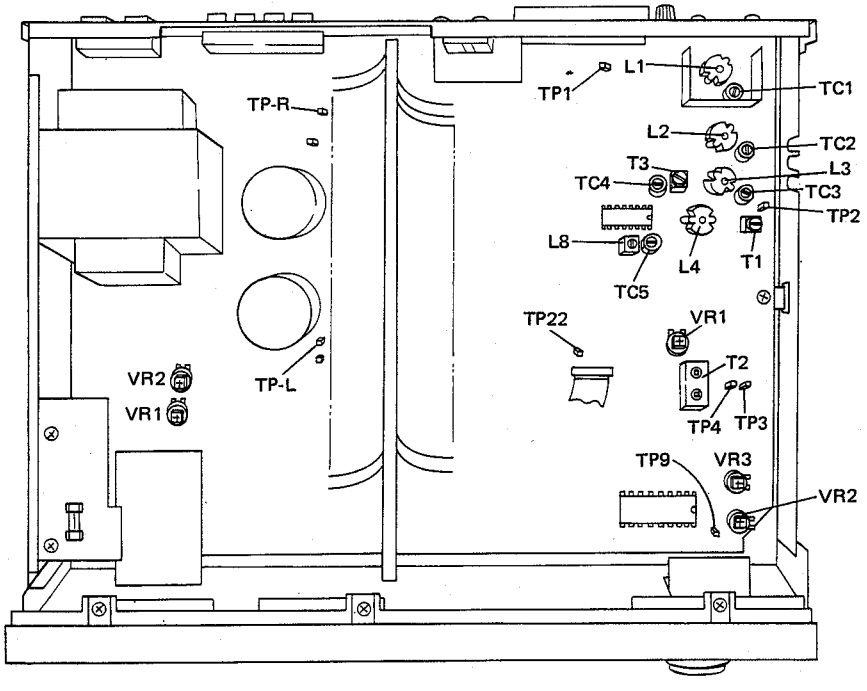


Fig. 9 Point de réglage

9. AJUSTE

Sección del sintonizador de FM

- Conectar un generador de señales de FM (FM SG) al terminal de antena de FM de 300 ohmios mediante una antena ficticia.
- Poner el selector de función (FUNCTION) en la posición FM y el del modo de sintonización (TUNING MODE) en la de Manual.

Paso	SG (400Hz, ±75kHz de desv.)		Frecuencímetro del SX-60	Punto de ajuste	Procedimiento de ajuste
	Frecuencia	Nivel			
1	Sin señal		108,00MHz	L4	25V CC entre TP2 y TP1 (masa)
2			87,50MHz	—	Confirmar que la tensión de CC entre TP2 y TP1 sea de 7V±1V.
3	90MHz	60dB	90,00MHz	L1 — L3	Ajustar de modo que la tensión de CC entre TP22 y TP1 (masa) sea la máxima.
4	106MHz	60dB	106,00MHz	TC1 — TC3	
5	Repetir los pasos 3 y 4 hasta obtenerse la tensión máxima.				
6	98,000MHz*	66dB	98,00MHz	T1	Ajustar hasta que la tensión de CC entre TP22 y TP1 (masa) sea la máxima.
7				T2 (CENTER)	0V CC entre TP3 y TP4
8				T2 (DIST)	Minimizar la distorsión en el terminal REC 1
9	Repetir los pasos 7 y 8 hasta satusfacerse los requisitos.				
10	98MHz	37dB	98,00MHz	VR1	Ajustar de modo que se iluminen los indicadores de sintonización.

** La frecuencia debe ser precisa.*

Sección de multiplex de FM (FM MPX)

- Conectar un generador de señales estereofónicas de multiplex de FM al terminal de modulación exterior FM SG (generador de señales de FM).
- Ajustar la salida del FM SG a 98,000MHz (con el modo de modulación ajustado a externa) y sintonizar el SX-60 a la frecuencia (98,000MHz).

Paso	FM MPX SG		Punto de ajuste	Procedimietos de ajuste
	Modulación	Nivel		
1	Sin modulación	66dB	VR2	Ajustar la señal en YP9 a 76kHz.
2	Principal (1kHz, Izq. + Der. ±33,75kHz de desv.) Piloto (19kHz, ±7,5kHz de desv.)	86dB	T1 (dentro de ±90°)	Minimizar la distorsión en el terminal REC 1.
3	Principal (1kHz, Izq. y Der., ±33,75kHz de desv.) Piloto (19kHz, ±7,5kHz de desv.)		VR3	Ajustar hasta que la diafonía entre los canales Izq. y Der. (en el terminal REC 1) sea la mínima.

Sección del sintonizador de AM

- Conectar la antena de cuadro de AM al terminal para antena de AM.
- Poner el selector de función (FUNCTION) en la posición AM, el de modo de sintonización en la posición MANUAL, y el se paso de canal (CHANNEL STEP) en la posición de 9kHz.

Paso	AM SG (400Hz, 30% de mod.)		Frecuencímetro del SX-60	Punto de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1	Sin señal		522kHz	L8	2V CC entre TP2 y TP1 (masa)
2			1620kHz	TC5	25V CC entre TP2 y TP1 (masa)
3	Repetir los pasos 1 y 2 hasta que se logre la tensión requerida.				
4	603kHz	60dB	603kHz	T3	Ajustar hasta que la tensión entre TP22 y TP1 (masa) sea la máxima.
5	1395kHz	50dB	1395kHz	TC4	
6	Repetir los pasos 4 y 5 hasta obtenerse la tensión máxima.				

SECCION DEL AMPLIFICADOR

1. Girar el control VOLUME a la posición mínima.
2. Poner el selector de altavoces A (SPEAKER A) en ON.
3. Ajustar VR1 de modo que la tensión de CC entre los terminales TP-L y L + SPEAKER A sea de 40mV.
4. Ajustar VR2 de modo que la tensión de CC entre los terminales TP-R y R + SPEAKER A sea de 40mV.

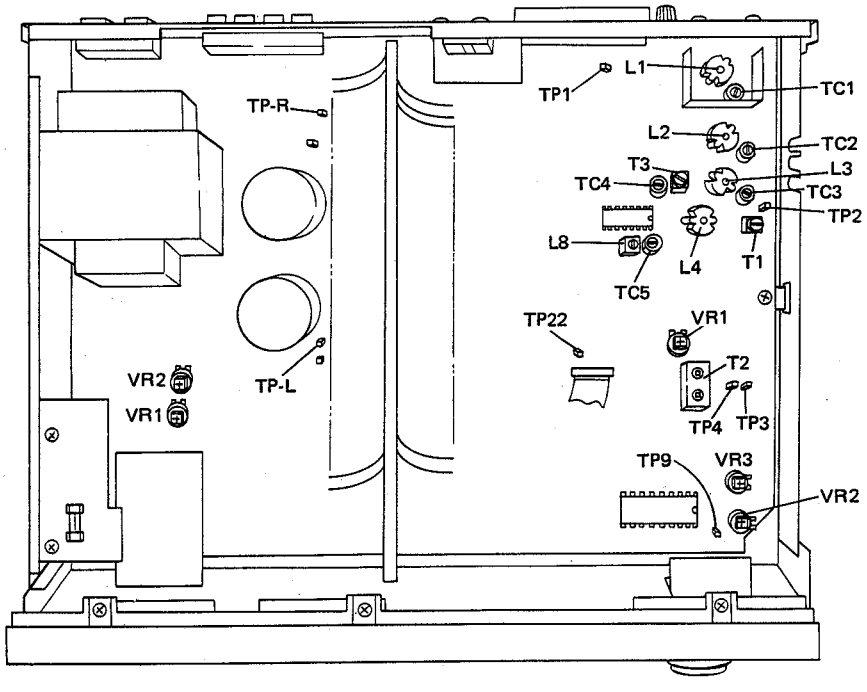


Fig. 9 Punto de ajuste

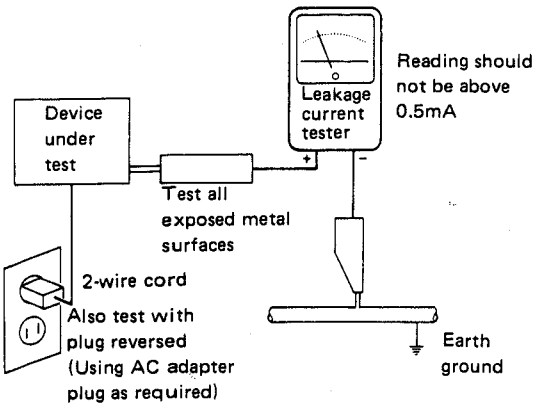
10. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Leakage current tester
Reading should not be above 0.5mA
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.